PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
LARRY E. HENNEMAN, JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVENUE
THREE RIVERS, MI 49093

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing *(day/month/year)* 27 AUG 2008
Applicant's or agent's file reference 0025-027PCT	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US2007/013014	International filing date *(day/month/year)* 31 May 2007
Applicant FLEXTRONICS AP LLC	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver Telephone No. 571-272-7774

Form PCT/ISA/220 (January 2004)

(See notes on accompanying sheet)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0025-027PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2007/013014	International filing date *(day/month/year)* 31 May 2007	(Earliest) Priority Date *(day/month/year)* 31 May 2006
Applicant FLEXTRONICS AP LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

   b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

   ☒ the text is approved as submitted by the applicant

   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   ☒ the text is approved as submitted by the applicant

   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

   a. the figure of the **drawings** to be published with the abstract is Figure No. 3

   ☒ as suggested by the applicant

   ☐ as selected by this Authority, because the applicant failed to suggest a figure

   ☐ as selected by this Authority, because this figure better characterizes the invention

   b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/013014

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H01J 5/02 (2008.04)
USPC - 250/239
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - H01J 5/02; 40/14 (2008.04)
USPC - 250/239

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US 2005/0274883 A1 (NAGANO) 15 December 2005 (15.12.2005) entire document	1,6-8,10,11 ---- 2-5,9,12,13
X ---- Y	US 6,686,588 B1 (WEBSTER et al) 03 February 2004 (03.02.2004) entire document	14 ---- 2-5,9,12,13
Y	US 2004/0027687 A1 (BITTNER et al) 12 February 2004 (12.02.2004) entire document	3,13
A	US 2006/0006486 A1 (SEO et al) 12 January 2006 (12.01.2006) entire document	1-14

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 August 2008	27 AUG 2008

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2005)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
LARRY E. HENNEMAN, JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVENUE
THREE RIVERS, MI 49093

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	27 AUG 2008
Applicant's or agent's file reference 0025-027PCT	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2007/013014	31 May 2007	31 May 2006

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H01J 5/02 (2008.04)
USPC - 250/239

Applicant
FLEXTRONICS AP LLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	13 August 2008	Blaine Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2007/013014

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2007/013014

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2-5,9,12,13	YES
	Claims	1,6-8,10,11,14	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-14	NO
Industrial applicability (IA)	Claims	1-14	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1, 6-8, 10, and 11 lack novelty under PCT Article 33(2) as being anticipated by Nagano.

Regarding claim 1, Nagano discloses a digital camera module (P. 9, lines 30) comprising: a circuit substrate (FIG. 3, (13) "insulating sheet", P. 3 [0050]); a housing mounted on said circuit substrate (FIG. 3, wherein the "holding module" (5) is bonded to the "insulating sheet" (13), P. 2 [0047], P. 3 [0050]); an image capture device coupled to said circuit substrate (FIG. 3, wherein the "imaging sensor chip" (16) is connected to the "insulating sheet", P. 3 [0050, 0051]; and wherein said housing allows said image capture device to be mounted to said circuit substrate after said housing is mounted on said circuit substrate (FIG. 7, shown below, wherein the "holding module" (5) is mounted onto the "insulating sheet" (13) before the "imaging sensor chip" (16), P. 4 [0062-00691]).

Regarding claim 6, Nagano further discloses the digital camera module according to claim 1, wherein said housing is coupled to said circuit substrate after said housing is formed (FIG. 7, wherein the "holding module" (5) is bonded to the "insulating sheet" (13) with the "adhesive agent" (15), P. 4 [0062-00691]).

Regarding claim 7, Nagano further discloses the digital camera module according to claim 1, wherein said housing is capable of withstanding an attachment process used to mount said image capture device onto said circuit substrate (FIG. 7, wherein the "holding module" (5) is capable of withstanding the attachment process, e.g. increased temperature and pressure, used to bond the "imaging sensor chip" (16) to the "insulating sheet" (13), P. 4 [0062-0069]).

Regarding claim 8, Nagano discloses a method for manufacturing a camera module comprising:
providing an image capture device (FIG. 3, wherein the "imaging sensor chip" (16) is connected to the "insulating sheet", P. 3 [0050,0051]); providing a circuit substrate (FIG. 3 (13) "insulating sheet", P. 3 [0050]); mounting a housing onto said circuit substrate (FIG. 3, wherein the "holding module" (5) is bonded to the "insulating sheet" (13), P. 2 [0047], P. 3 [0050]); and mounting said image capture device onto said circuit substrate after said housing is mounted on said circuit substrate (FIG. 7, wherein the "holding module" (5) is mounted onto the "insulating sheet" (13) before the "imaging sensor chip" (16), P. 4 [0062-0069]).

Regarding claim 10, Nagano further discloses the method for manufacturing a camera module according to claim 8, wherein: said step of mounting said housing onto said circuit substrate includes mounting said housing on a first surface of said circuit substrate (FIGS. 3,7, wherein the "holding module" (5) is bonded to the top surface of the "insulating sheet" (13), P. 3 [0050] , P. 4 [0062-00691]); and said step of mounting said image capture device onto said circuit substrate includes mounting said image capture device on a second surface of said circuit substrate opposite said first surface of said circuit substrate (FIGS. 3,7, wherein the "imaging sensor chip" (16) is bonded to the bottom surface of the "insulating sheet" (13), P. 3 [0050], P. 4 [0062-0069]).

Regarding claim 11, Nagano further discloses the method for manufacturing a camera module according to claim 8, said step of mounting said housing onto said circuit substrate includes mounting a preformed housing onto said circuit substrate (FIG. 7, wherein the "holding module" (5) is bonded to the "insulating sheet" (13) with the "adhesive agent" (15), P. 4 [0062-0069]).

Claim 14 lacks novelty under PCT Article 33(2) as being anticipated by Webster et al., hereinafter referred to as Webster.

Regarding claim 14, Webster discloses a method for manufacturing camera modules comprising:
providing a plurality of image capture devices (FIG. 8 (108) "image sensors", col. 12 lines 43-49); providing a circuit substrate having a plurality of individual camera module circuit boards embodied therein (FIG. 8, wherein a plurality of individual "substrates" 102 each having an individual "base" (104) are integrally connected together" forming a circuit substrate, col. 11 lines 37-50); providing a plurality of housings (wherein a housing is shown in FIG. A, modified version of FIG. 8, below, col. 11 line 37 to col. 12 line 57; a housing is also shown as the pair of "sidewalls" (106) in FIG. 2, col. 3 line 32 to col. 4 line 30); mounting a respective one of said housings onto each of said individual camera module circuit boards (FIGS. 2,8, wherein the "sidewalls" (106) are integrally formed onto each of the "bases" (104), col. 3 line 32 to col. 4 line 30, col. 11 line 37 to col. 12 line 57); and mounting a respective one of said image capture devices onto each of said individual camera module circuit boards (FIG. 8, wherein one "image sensor" (108) is attached to each of the "bases" (104), col. 12 lines 43-49), each of said image capture devices being mounted on an associated one of said camera module circuit boards after one of said housings is mounted on said associated camera module circuit board (FIGS. 2,8, wherein the "sidewalls" (106) and the "base" (104) are integrally formed in a single piece, thus, the "sidewalls" (106) are mounted on the "base" (104) before the "image sensor" before the "image sensor" (108), col. 4, lines 11-30, col. 11, line 37 to col. 12, line 57).

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Claims 2, 4, 5, 9, and 12 lack an inventive step under PCT Article 33(3) as being obvious over Nagano in view of Webster.

Regarding claim 2, Nagano discloses the digital camera module according to claim 1. Nagano does not specifically disclose that housing is molded onto said circuit substrate.
Webster teaches an optical module, wherein a housing is molded onto a circuit substrate (FIG. 2, wherein the "sidewalls" (106) and the "base" (104) are pre-molded and are integrally formed into a single piece, col. 4 lines 11-30).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the molding feature of Webster's with the module taught by Nagano for the purpose of simplifying the fabrication process.

Regarding claim 4, Nagano and Webster disclose and teach of the digital camera module according to claim 2, wherein Nagano further discloses that said housing is coupled to a surface of said circuit substrate and said image capture device is coupled to an opposite surface of said circuit substrate (FIGS. 3, 7, wherein the "holding module" (5) is bonded to the top surface of the "insulating sheet" (13), and the "imaging sensor chip" (16) is bonded to the bottom surface of the "insulating sheet" (13) P. 3 [0050] , P. 4 [0062-0069]).

Regarding claim 5, Nagano and Webster disclose and teach of the digital camera module according to claim 4, wherein Nagano further discloses that said circuit substrate defines an aperture (FIGS. 3, 6A, 6B, 7, wherein the "insulating sheet" (13) defines an "opening" (21), P. 4 [0059, 0065]); and said image capture device is mounted so that light passing through said aperture impinges on a light sensitive portion of said image capture device (FIGS. 3, 6A, 6B, 7, wherein the "imaging sensor chip" (16) is mounted so that light passing through the "opening" (21) impinges on the "light-receiving area" (17), P. 4 [0059,0065]).

Regarding claim 9, Nagano discloses the method for manufacturing a camera module according to claim 8. Nagano does not specifically disclose that said step of mounting said housing onto said circuit substrate includes molding said housing onto said circuit substrate.
Webster teaches an optical module, wherein a step of mounting a housing onto a circuit substrate includes molding said housing onto said circuit substrate (FIG. 2, wherein the "sidewalls" (106) and the "base" (104) are pre-molded and are integrally formed into a single piece, col. 4 lines. 11-30).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the molding feature of Webster's with the method taught by Nagano for the purpose of simplifying the fabrication process.

Regarding claim 12, Nagano discloses the method for manufacturing a camera module according to claim 8. Nagano does not disclose said step of mounting said image capture device onto said circuit substrate includes mounting said image capture device through an opening in said housing.
Webster teaches an optical module, wherein a step of mounting an image capture device onto a circuit substrate includes mounting said image capture device through an opening in a housing (FIGS. 2,8, wherein the "sidewalls" (106) and the "base" (104) are integrally formed into a single piece, thus, the "sidewalls" (106) are mounted on the "base" (104) before the "image sensor" (log), and the "image sensor" (108) is mounted to the "base" (104) through the opening defined by the "sidewalls" (106), col. 4 lines. 11-30, col. 11 line 37 to col. 12 line 57).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the molding feature of Webster's with the method taught by Nagano to insert the image capture device through the opening of the housing for the purpose of simplifying the fabrication process and protecting the image capture device from ambient environment such as dust.

Claims 3 and 13 lack an inventive step under PCT Article 33(3) as being obvious over Nagano in view of Webster in view of Bitter et al. hereinafter referred to as Bittner.

Regarding claim 3, Nagano and Webster disclose and teach of the digital camera module according to claim 2, wherein Webster further discloses that said housing defines a cavity having a dimension greater than the dimension of said image capture device to accommodate said image capture device with a diagonal (shown in FIG. 2, col. 3 line. 32 to col. 4 line. 30).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the dimensions of Webster's housing and image capture device with the module taught by Nagano to insert the image capture device through the opening of the housing for the purpose of simplifying the fabrication process and protecting the image capture device from ambient environment such as dust.
Nagano and Webster do not disclose that said housing defines a bore with a diameter larger than a diagonal of said image capture device.
Bittner teaches an image capture device that includes a retainer with two bores therethrough. Each bore (Bittner: fig. 6; [94a and 94b]) is proximal to and aligned with an engaging pin (Bittner: fig. 6 [92a, 92b]) and is sized to receive a guide pin (Bittner: paragraph 50; fig. 3, [65]).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine housing defined bore of Bittner with the module taught by Nagano and Webster for the purpose of reducing material and cost by making the housing cylindrical, instead of rectangular, to complement the cylindrical lens barrel with minimum material yet big enough to accommodate the image capture device.
Further though Bittner does not explicilty disclose the size of the bore in relation to the diagonal of the image capture device it would have been obvious to one of ordinary skill in the art at the time fo the invention to create bore larger than the diagonal of the image capture device since such a modification would involve a mere change in size and a change in size is generally recognized as being within the level of ordinary skill in the art.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Regarding claim 13, Nagano and Webster disclose and teach of the method for manufacturing a camera module according to claim 12, wherein Webster further discloses that said step of mounting said image capture device onto said circuit substrate includes mounting said image capture device through a cavity in said housing adapted to receive a lens unit (FIG. 2, wherein the "image sensor" (108) is mounted through a cavity defined by the "sidewalls" (106) adapted to receive the "lens housing" (130), col. 3 line 32 to col. 4 line 30).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the dimensions of Webster's housing and image capture device with the module taught by Nagano to insert the image capture device through the opening of the housing for the purpose of simplifying the fabrication process and protecting the image capture device from ambient environment such as dust.
Nagano and Webster do not specifically disclose that the housing defines a bore.
Bittner teaches an image capture device that includes a retainer with two bores therethrough. Each bore (Bittner: fig. 6; [94a and 94b]) is proximal to and aligned with an engaging pin (Bittner: fig. 6 [92a, 92b]) and is sized to receive a guide pin (Bittner: paragraph 50; fig. 3, [65]).
It would have been obvious to one of ordinary skill in the art at the time of the invention to combine housing defined bore of Bittner with the module taught by Nagano and Webster for the purpose of reducing material and cost by making the housing cylindrical, instead of rectangular, to complement the cylindrical lens barrel with minimum material yet big enough to accommodate the image capture device.

Claims 1-14 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.